MULTIMEDIA UNIVERSITY

STUDENT ID NO

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 1, 2022/2023 (TERM ID 2210 & TERM ID 2215)

ECT1016 – CIRCUIT THEORY

(RE/TE)

17 FEBRUARY 2023
9:00 a.m - 11:00 a.m
(2 Hours)

INSTRUCTIONS TO STUDENT

1. This Question paper consists of 6 pages including cover page with 4 Questions only.
2. Attempt **ALL** questions. All questions carry equal marks and the distribution of the marks for each question is given.
3. Please write all your answers in the Answer Booklet provided.

Question 1

a) Consider the voltage signal in Figure 1.

i. What is the period of X?

[1 mark]

ii. Determine the average value of X.

[4 marks]

iii. Determine the root-mean-square value of X.

[10 marks]

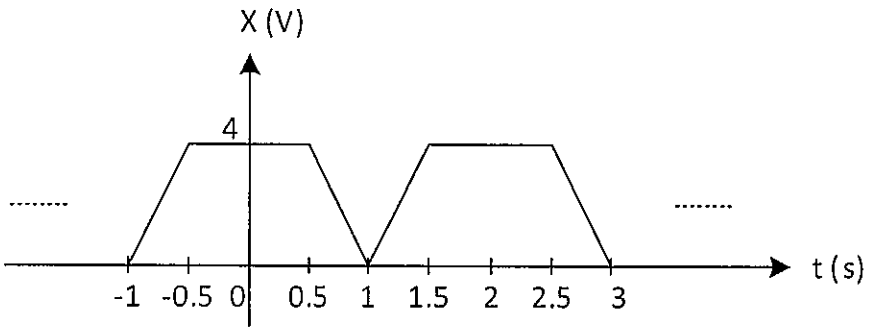

Figure 1

b) Determine the current flows across each of the passive elements in the circuit shown in Figure 2. Then, determine the total power delivered by the voltage source.

[10 marks]

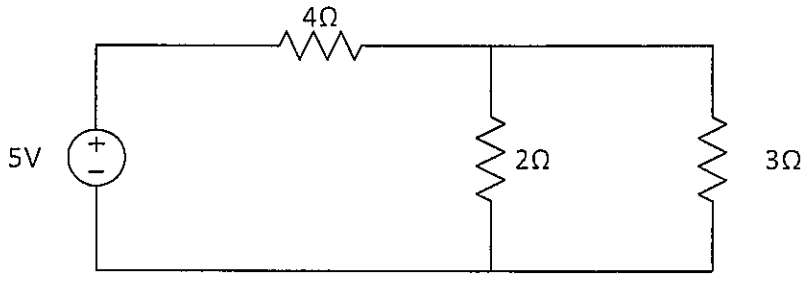

Figure 2

Continued .....

Question 2

For the circuit shown in Figure 3,

a) Find the voltage drop across R_3, by using nodal analysis.

[11 marks]

b) Determine the Norton Equivalent Circuit, if R_3 is the load. If maximum power must be delivered to R_3, what the value of R_3 must be changed to? Determine the maximum power delivered to R_3.

[14 marks]

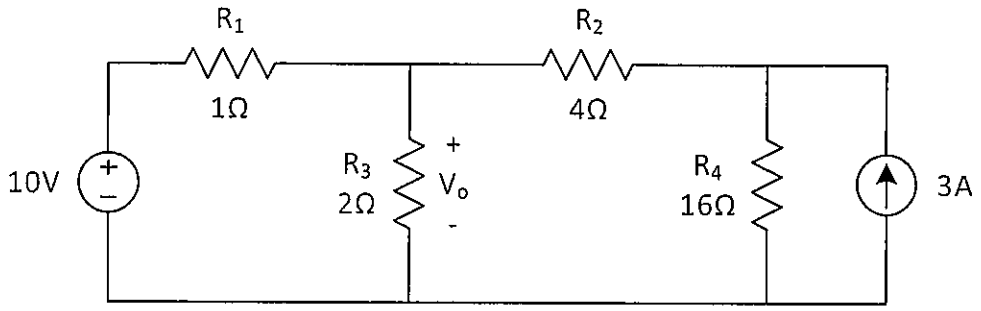

Figure 3

Continued .....

Question 3

a) Consider the circuit shown in Figure 4, determine the total

i. impedance Z_T

[3 marks]

ii. current I_S

[2 marks]

iii. apparent power

[2 marks]

iv. real power

[1 mark]

v. reactive power

[1 mark]

vi. power factor

[2 marks]

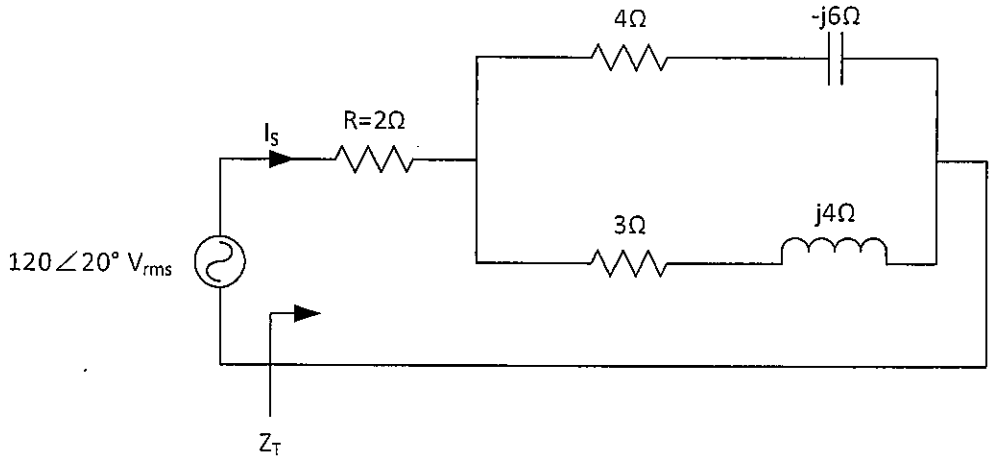

Figure 4

Continued .....

b) For the circuit shown in Figure 5, convert the circuit into frequency domain and determine the average power delivered to each passive element. The voltage source is $v_s = 10\cos(4t - 30°)$.

[14 marks]

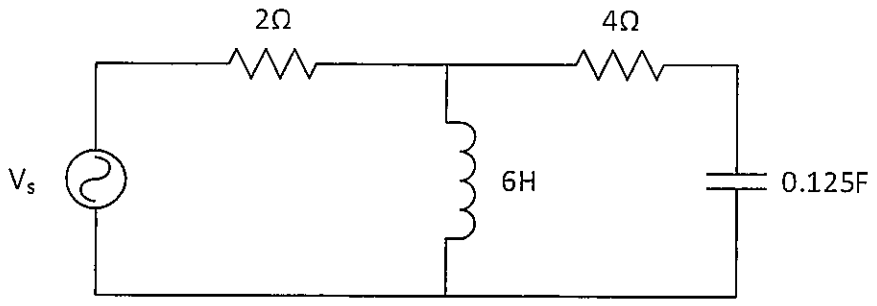

Figure 5

Continued .....

Question 4

a) If $R = 8\Omega$ and $C = 4000uF$, what value of L will make a parallel RLC circuit critically damped? What happens if L is larger or smaller than this value? (State whether the system is overdamped or underdamped.)

[7 marks]

b) The switch in the circuit shown in Figure 6 is closed at $t = 0$. The capacitor in the circuit is initially uncharged. Determine the expression for the current $i(t)$.

[18 marks]

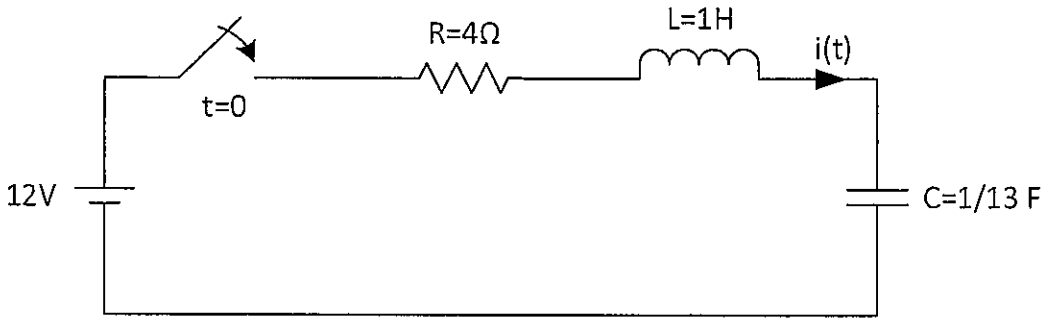

Figure 6

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